

The second section of the volume is devoted to Zoology, and consists of two Reports—one of them an invaluable monograph by Mr. A. S. Packard, jun., on Phyllopod Crustacea, recent and fossil, illustrated with thirty-nine plates and a coloured map showing the zoological provinces of North America. This memoir will be welcomed by all who take interest in the investigation of genealogies and of the history of distribution in the animal kingdom. Dr. R. W. Shufeldt concludes the volume with an essay on the osteology of various American Birds, likewise copiously illustrated with woodcuts and with lithograph plates.

From this outline it will be seen how well Dr. Hayden has sustained to the last the character of the Survey under his charge. During his tenure of office he proved himself to be endowed with rare powers of organization and administration and to possess wide views of the scope of a survey which, like his, was to break ground for the first time in new and unknown territories. He might have been simply an explorer, anxious to find out the sources of rivers, the positions of passes, the heights of peaks, and the trend of mountain-ranges. He might have been a mere geologist, desirous of adding some thousand miles of new area to formations already known or of discovering formations such as have no precise parallel elsewhere. He might have been only a topographer, caring chiefly for the accuracy of his triangulations and levellings. He might have been a botanist or zoologist, eager to add new species to the known flora and fauna of the earth's surface. In one sense Dr. Hayden was none of these; in another sense he combined the functions of them all. In later years his executive duties appear to have left him little opportunity for carrying on original research himself. But he had sympathy with all the pursuits just named, and had the faculty of choosing good men for prosecuting them. He had force of character enough to succeed in battling his way and getting his appropriations from Congress, and he had the perseverance to press forward his operations, keeping his fellow-labourers together and publishing with their aid a series of volumes of which the United States may well be proud.

The consolidation of the various Surveys under one organization was an inevitable and entirely justifiable step on the part of Congress, and the United States Geological Survey could not be under more energetic and skilful direction than that of its present estimable chief, Major Powell, with the cooperation of such leaders in geological enterprise as Mr. Gilbert, Captain Dutton, and their colleagues. Nevertheless, it may be permitted to a geologist on this side of the Atlantic, who looks disinterestedly but not unsympathetically upon the progress of events on the other side, to express his regret that it should not have been possible to find a place where scope might have been afforded for the talents of one who had done such good service to geology as Dr. F. V. Hayden.

ARCH. GEIKIE

OUR BOOK SHELF

Attraction et Gravitation d'après Newton. Par Mme. Clémence Royer. Extracted from the Review "*Philosophie positive.*" Pp. 23. (Paris, 1883.)

It is very surprising to find what is, in most other respects, a really well-written and able dissertation on

the question of *action at a distance* marred at the very outset by an almost inexplicable blunder.

Madame Royer has evidently read much, and lays down with great clearness the distinction between Newton's Theory of *Gravitation* as a mode of grouping together under one simple law the whole phenomena of physical astronomy, and the assumption handed down from old Greece, of a mutual *attraction* exerted upon one another by any two portions of matter. She shows that Newton everywhere expresses himself in the most explicit terms against the notion of distance-action. But she also points out the curious distinction between Newton in the *Principia*, the pure mathematician and physicist, who constructs no hypotheses and declares that the mode in which gravitation is produced is one which he has not been able to discover from the phenomena themselves; and Newton in his *Optics*, the bold speculator, who discusses the possible characteristics and properties of the medium by which gravitation may be produced.

This is, on the whole, so well done that we are positively amazed to find the all-important property of matter, *Inertia*, absolutely and entirely ignored. From a psychological point of view, the following remarks, by such a writer as Madame Royer shows herself to be, are of the very highest interest and curiosity:—

"Qu'est-ce en effet que la notion de *masse*, si ce n'est celle d'un corps déjà considéré comme pesant? Un corps sans pesanteur serait-il une masse? en aurait-il les propriétés mécaniques? Une masse, supposée absolument isolée dans l'espace, aurait-elle un poids? Evidemment non, puisque le poids ne naît que des rapports de grandeur et de distance des masses. Dire que le poids ou la masse est proportionnel à la quantité de matière ou de substance, c'est affirmer une chose que nous ne savons pas, que nous ne pouvons absolument savoir d'aucune manière. Tout ce que nous savons c'est que, considérant des corps déjà pesants, en vertu de leurs relations de quantité et de distance, leur pesanteur croît en raison de ces quantités et en raison inverse de ces distances, sans que leurs quantités, comme matière, soient altérées, de façon que des masses doubles ont une tendance deux fois plus forte à tomber l'une vers l'autre, ce qui fait qu'elles s'approchent en réalité avec la même vitesse (*sic*), et que si leur distance devient moitié moindre, elles s'approchent quatre fois plus vite l'une de l'autre.

"Mais comme l'unique moyen que nous ayons de mesurer la grandeur de ces masses est de les peser, nous restons dans l'impossibilité absolue de dire si des masses de même poids, en même relation de distance avec d'autres masses pesantes, contiennent, oui ou non, la même quantité de matière."

Evidently Madame Royer, in reading the *Principia*, has failed to notice, not only the definition of *Vis insita* but also, those important pendulum experiments by which Newton satisfied himself of the exact proportionality of weights to masses, in any one place. Here we see, in no doubtful manner, the evil effects of an education in which athletics have no part. No one, man or woman, who has had experience of Indian clubs or of dumb-bells, could for a moment doubt that we have another mode of distinguishing mass, besides weighing.

Electrotechnisches Jahrbuch von der Electrotechnischen Gesellschaft in Frankfurt am Main. (1883.)

ALL over Germany are springing up electrotechnical societies, in emulation of those in Berlin and Vienna, fulfilling a kindred part to that played in Great Britain by the much older Society of Telegraph Engineers and Electricians. The volume published by the Frankfurt Society—the first of its *Proceedings*—contains several papers of interest. Amongst these may be noticed two by Dr. Th. Stein of Frankfurt, on the measurement of small intervals of time by the photographic electric method; and on certain modern electro-chirurgical apparatus, especially modifications of the influence-machine of Holtz. In the first of these papers Dr. Stein describes an apparatus for photographing the pulsations of the heart, &c., as conveyed by a Marey's tambour to an apparatus which at

the same time causes a record from an automatic tuning-fork interrupter to be imprinted side by side on the photographic plate. In Dr. Stein's second paper, he describes the use of a small Deprez electromotor to drive a small fan, by which warm, dry air is caused to circulate round a Holtz machine, which by this means is always ready for action. In some historical notes by Herr Holthof, dealing with the early stages of telegraphy, there comes out the interesting point that, so early as 1854, an important improvement had been made in the suggestion of Bourseul for an electric telephone. An anonymous writer, signing himself "L." in the pages of "Didaskalia," gave in that year, under the title of "Elektrische Telephonie," an account of Bourseul's crude notion, and added something not to be found in Bourseul's suggestion, namely, the use of an electromagnet in the receiver to actuate the disk of thin metal to which the listener was to apply his ear; the description of the instrument—which, it seems, never reached anything beyond an anonymous suggestion—reads like a description of a Bell telephone, of which it is a remarkable foreshadowing. It is remarkable that Reis, who was at that time resident in Frankfort, should, when using an electromagnet in his subsequently invented telephone, have stopped short of the use of a disk in his receiver in place of the bar armature he employed. It is pretty clear he did not know of "L.'s" suggestion. The remainder of the papers in the "Year-book" deal chiefly with telegraphic and fire-alarm apparatus. The Frankfort Society is to be congratulated on the value of the papers communicated to it during its short existence.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

What are the Saccopharyngoid Fishes?

IN December of last year M. Vaillant communicated to the French Academy of Sciences a notice of a remarkable deep sea fish, to which he gave the name *Eurypharynx pelecyanoides*. He was in great doubt as to the relations of this form, but concluded that "of all fishes it is to *Malacosteus niger*," placed in the family Scopelidae by zoologists, that he was most inclined to approximate the new type. Five specimens of a nearly related form, to which Mr. J. A. Ryder and myself have given the name *Gastrostomus bairdii*, were obtained by the United States Fish Commission steamer *Albatross*, in the summer and autumn of the present year. The largest of these specimens is nearly two feet long, and an anatomical investigation reveals some very remarkable peculiarities of structure, which have caused Mr. Ryder and myself to differentiate the two forms, *Gastrostomus* and *Eurypharynx*, in a distinct order of fishes to which we have given the name *Lyomeri*.

The *Lyomeri* are fishes with five branchial arches (none modified as branchiostegal or pharyngeal) far behind the skull; an imperfectly ossified cranium, deficient especially in nasal and vomerine elements, articulating with the first vertebra by a basioccipital condyle alone; with only two cephalic arches, both freely movable, (1) an anterior dentigerous one, the palatine, and (2) the suspensorial, consisting of the hyomandibular and quadrate bones; without opercular elements; without maxillary bones, or distinct posterior bony elements to the mandible, with the scapular arch imperfect (limited to a single cartilaginous plate) and remote from the skull; and with separately ossified but imperfect vertebrae. Whether other than the two genera mentioned, *Eurypharynx* and *Gastrostomus*, belong to this order is not entirely certain, but there is little doubt, in the opinion of Mr. Ryder and myself, that the family Saccopharyngidae also belongs to the order, and it is for the purpose of calling attention to this doubtful and still little known type, that in behalf of Mr. Ryder and myself I address the present communication. No satisfac-

tory information has been given as to the Saccopharyngidae, except by Dr. Mitchill in 1824, and by Dr. Harwood in the *Philosophical Transactions* for 1827. The plate published in the volume cited represents the head of *Ophiognathus* with the mouth closed as well as open, and the differences in the relation of the posterior angles of the mouth to the axis indicate that *Ophiognathus* (as well as *Saccopharynx*) has a movable suspensorium, and would therefore exhibit the *Lyomeri* peculiarity of structure. It appears from Dr. Günther's "Catalogue of the Fishes in the British Museum" (vol. viii. p. 22), that in 1870 there were two specimens of a Saccopharyngoid fish—probably the *Ophiognathus ampullaceus*—in the British collection. (It is possible that the so-called young mentioned in the Catalogue may be a *Eurypharyngoid*.) The question whether that species belongs to the *Lyomeri* can therefore be readily settled negatively or affirmatively. Assuming that the family Saccopharyngidae belongs to the order, the two families would apparently be distinguishable as follows:—

The *Eurypharyngidae* are *Lyomeri* with the branchio-anal portion much shorter than the rostral-branchial; with the tail very elongated and moderately attenuated backwards; the head flat above and with a transverse rostral margin, at the outer angles of which the eyes are exposed; with the palatine jaws excessively elongated backwards and the upper parallel, and closing against each other as far as the articulation of the two suspensorial bones; with minute teeth on both jaws; the dorsal and anal fins well developed, and continued nearly to the end of the tail, and with minute narrow pectoral fins.

The Saccopharyngidae appear to be *Lyomeri* with the branchio-anal portion much longer than the rostral-branchial; the tail excessively elongated and attenuated; the cranium unknown; the eyes antero-lateral; with the palatine bones moderately extended backwards (in comparison with the *Eurypharyngidae*), and apparently not closable against each other; with enlarged teeth in one or both jaws; with the dorsal and anal fins feebly developed, and with pectorals small but broad. *Saccopharynx* is considered by Dr. Günther to consist of "deep-sea congers," but evidently it is not at all related to the congers or any other allied fishes.

I can assure English naturalists that no type of fishes will more fully reward investigation than the Saccopharyngidae, and it is to be hoped that some master of applied anatomy, like Profs. Huxley or Lankester, may deem an examination of the specimens in the British Museum worthy of their attention. A few of the many remarkable peculiarities of organisation of the type have been described in an article "On the Anatomy and Relations of the *Eurypharyngidae*," by Theodore Gill and John A. Ryder, in the *Proceedings of the United States National Museum* for 1883 (pp. 262-273), and a full monograph will appear later. May we hope for information respecting *Saccopharynx* in time to correlate it with that on *Gastrostomus*? THEO. GILL

Cosmos Club, Washington, December 18, 1883

The Mildness of the Season

As the flowering of plants at this time of the year is perhaps the best indication of the mildness of the season, I send you a list of the plants from which I and a friend gathered one or more flowers on the 24th and 26th inst. I have given the list of each day's gathering separately. Those on the 24th were gathered between this city and Hinton Charterhouse, once noted for its Carthusian monastery. Those of the 26th were gathered between Bath and Bradford-on-Avon, a very old town which contains the remains of a Saxon church and one of the finest tithe barns in England. VIATOR

Bath, December 27, 1883

List of Plants from which Flowers were gathered on December 24

Draba verna (Spring Whitlow Grass)
Primula acaulis (Primrose)
Veronica officinalis (Com. Speedwell)
Bellis perennis (Daisy)
Centaurea scabiosa (Greater Knapweed)
Ulex europaeus (Com. Furze)
Achillea millefolium (Com. Yarrow)
Crepis virens (Smooth Hawk's Beard)
Lamium album (White Deadnettle)
Fragaria v. sca (Wood Strawberry)

Gathered on December 26

Ranunculus repens (Creeping Crowfoot)
Cheiranthus chieri (Com. Wallflower)